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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/825,884	04/16/2004	Marc Le Metais	040183-000300US	8608
20350 7590 10/29/2007 TOWNSEND AND TOWNSEND AND CREW, LLP TWO EMBARCADERO CENTER EIGHTH FLOOR SAN FRANCISCO, CA 94111-3834			EXAMINER PETTITT, JOHN F	
			ART UNIT 3744	PAPER NUMBER
			MAIL DATE 10/29/2007	DELIVERY MODE PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

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Office Action Summary	Application No. 10/825,884	Applicant(s) LE METAIS, MARC	
	Examiner /John Pettitt/	Art Unit 3744	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 21 May 2007.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 3-7, 9, 11, 13, 15 and 17 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 3-7, 9, 11, 13, 15 and 17 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08)
Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

Claim Objections

1. **Claims 3-7, 9, 11, 13, 15 and 17** are objected to because of the following informalities:

In regard to claim 3, the recitation, "Plant for" (line 1) should read --A plant for--

In regard to claims 4-7, 9, 11, the recitation, "Plant of" (line 1) should read --The plant of--.

In regard to claim 13, the recitation, "Process for" (line 1) should read --A process for--

In regard to claims 15, and 17, the recitation, "Process of" (line 1) should read -
-The process of--.

Appropriate correction is required.

Claim Rejections - 35 USC § 103

2. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

3. **Claims 3-7, 9, 13** are rejected under 35 U.S.C. 103(a) as being unpatentable over the obvious modification of Klein Nagel Voort (US 6,389,844 B1) hereafter Voort.

In regard to claim 3, Voort teaches a liquefaction plant comprising a pre-cooling heat exchanger (15); a distributor (4); two main heat exchangers (5 and 5'); two main

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refrigerant circuits (cooling the natural gas streams 25 and 25'); a pre-cooling refrigerant circuit (cooling the natural gas through heat exchange in heat exchanger 15); and that the main refrigerant circuits are separate from the pre-cooling refrigerant circuit.

Voort does not explicitly teach that the two additional circuits are separate from the pre-cooling circuit such that the additional circuits do not exchange heat with the pre-cooling circuit and such that the main circuits do not exchange heat with the pre-cooling circuit. However, propane is commonly used as the pre-cooling refrigerant in pre-cooling refrigerant circuits as the boiling point of propane is relatively high (see, for example, Voort--column 4, lines 25-31). One of ordinary skill in the art, at the time the invention was made, would have recognized that the condensation of the main refrigerants in the main refrigerant circuits (via heat exchangers 58 and 58') could be done more effectively (i.e. equivalent heat transfer with smaller heat exchangers (58 and 58') or higher flow rates with larger heat exchangers) by separating the two additional refrigerant circuits from the pre-cooling refrigerant circuit and charging the additional refrigerant circuits with a lower boiling point refrigerant.

The additional circuits would then be separated or combined depending on production demand and the sale price of natural gas. With higher demand and higher prices anticipated one would make the additional circuits separate such that production could be increased at the expense of the refrigeration components (capital costs - compressor, heat exchangers, etc). While with lower demand and lower prices one would combine the additional circuits (one compressor, one condenser, one expansion device and integrated refrigerant heat exchangers) to save on the capital costs. One of

ordinary skill in the art, at the time the invention was made, would know how to balance these demands and would be motivated to do so to improve the profitability of the plant.

In regard to claim 4, Voort teaches that the additional circuits each comprise a heat exchanger (58 and 58'); a compressor (50 and 50'); a cooler (56 and 56'); and an expansion device (45 and 45'). The inlet of the compressor (50 and 50') is connected to the outlet of the cold side of the heat exchanger (58 and 58') by return conduit (46 and 46'). The outlet of the compressor (50 and 50') is connected to the inlet of the cooler (56 and 56'). The conduit (44 and 44') extends via the expansion device (45 and 45').

In regard to claim 5, see claim 3 discussion of the separate additional circuit variant.

In regard to claim 6, see claim 3 discussion of the combined additional circuit variant.

In regard to claim 7, Voort teaches the plant comprises two main heat exchangers (5 and 5'); two main refrigerant circuits (9 and 9'), and two additional circuits (43 and 43').

In regard to claim 9, Voort teaches the pre-cooling refrigerant circuit comprises a heat exchanger (15); a compressor (31); a cooler (36); and an expansion device (38). The inlet (33) of the compressor (31) is connected to the outlet (40) of the cold side of the heat exchanger (15) by return conduit (41). The outlet (34) of the compressor (31) is connected to the inlet of the cooler (36). The conduit (line connecting outlet of cooler and the inlet of the heat exchanger (15)) extends via the expansion device (38).

In regard to claim 13, see claim 3.

4. **Claims 11, 15, and 17** are rejected under 35 U.S.C. 103(a) as being unpatentable over the obvious modification of Voort as described for claim 3 above and further in view of Roberts et al. (US 6,308,531 B1) hereafter Roberts.

In regard to claims 11 and 15, the obvious modification of Voort meets all the limitations of claims 3 and 13, except a pretreatment downstream of the pre-cooling heat exchanger. However, Roberts teach a pretreatment downstream of the pre-cooling heat exchanger for removing the heavy components from the gas (108, column 8, lines 6-16). Therefore, it would have been obvious to one of ordinary skill in the art, at the time the invention was made, to combine the liquefaction system discussed for claim 3 with the pretreatment described by Roberts for the purpose of removing part of the heavy components from the gas (scrub column 108, column 8, lines 6-16) as these components (for example pentane, hexane and heavier components) will freeze in the colder parts of the LNG processing equipment and may cause blockage problems.

In regard to claim 17, the process of claim 13 is an obvious process to carry out in the plant described for the rejection of claim 3. The process is not more limiting than basic operation of the plant described for the rejection of claim 3.

Response to Arguments

5. Applicant's arguments filed 05/21/2007 have been fully considered but they are not persuasive.

1. Applicant's arguments (p. 7 - p. 9, paragraph 2) are that none of the references employed in the rejection of claim 3 under 35 U.S.C. § 103(a) as unpatentable over Voort teach energetically separate pre-cooling/additional circuits and energetically separate main refrigerant/pre-cooling circuits. And further the applicant requires a reference that supports the assertions made that one of ordinary skill in the art, at the time the invention was made, would know how to modify the apparatus of Voort and would be motivated to do so. In response to the applicant's arguments, the examiner directs the applicant to Fanning (US 6,647,744), which teaches in Fig. 1 and column 2, lines 24-26 that it is old in the art to have separate pre-cooling and main circuits (where the main circuits are cascade cycles thereby having additional circuits). Therefore, the examiner maintains that, it would have been obvious to one of ordinary skill in the art, at the time the invention was made, to separate the precooling and additional circuits of Voort for the purpose of increasing the production flow rates as discussed in the rejection.

2. Applicant's arguments (p. 9 paragraph 4) are that the teachings of Voort teach away from separating the separate the pre-cooling and additional circuits. In response to the applicant's arguments, the examiner disagrees that the teachings of Voort would dissuade one of ordinary skill in the art from separating the circuits of Voort. In situations where the demand for natural gas is high, one of ordinary skill in the art, at

the time the invention was made, would have known that separating the pre-cooling and additional circuits would increase production, and therefore the profitability of the plant. As supported by Fanning, liquefaction systems are generally built as demand warrants the capital investment. Therefore the rejection is maintained.

3. Applicant's arguments (p.10-12) are that the dependent claims also lack the independent claim limitations. In response to the applicant's arguments see sections 1 and 2 above.

Conclusion

6. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

Sawchuk et al. (US 7,074,322) teaches separate main and pre-cooling circuits (Fig. 2). And further teaches a pretreatment (142) for removing heat components.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to /John Pettitt/ whose telephone number is 571-272-0771. The examiner can normally be reached on M-F 8a-4p.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Cheryl Tyler can be reached on 571-272-4834. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only.

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/John Pettitt/
Examiner
Art Unit 3744
JFP III
August 20, 2007

FRANTZ JULES
SUPERVISORY PATENT EXAMINER

A handwritten signature in black ink, appearing to read 'Frantz', with a large, stylized flourish extending to the right.